a torus-shaped carcass having a central crown portion and two axially opposite sidewalls terminating in a pair of beads for fixing the tyre onto a corresponding mounting rim, each bead comprising at least one circumferentially unextendable annular reinforcing core comprising a series of spirals of metal wire radially superimposed and axially arranged alongside each other;

a tread strip located on the crown portion and coaxially extending around the carcass and provided with a raised pattern for rolling contact with a road; and

a belt structure coaxially arranged between the carcass and the tread strip;

the carcass having a reinforcing structure comprising at least one ply of rubberized fabric reinforced with metal cords lying in radial planes containing an axis of rotation of the tyre, the reinforcing structure having ends secured to the annular reinforcing cores and a neutral profile, lying in a radial cross-sectional plane, axially extending from bead to bead, wherein:

the neutral profile intersects a cross section of a zone enclosing the annular reinforcing cores; and

the neutral profile has a continuous curvature devoid of inflection points along an extension between the beads.

17. (new) The tyre of claim 16, wherein each annular reinforcing core comprises a first axially innermost bead core and a second axially outermost bead core, one end of the at least one ply being inserted between the first and second bead cores.

18. (new) The tyre of claim 16, wherein the at least one ply comprises a plurality of rubberized-fabric bands alternately arranged, in at least one of the beads, on axially opposite sides of a respective annular reinforcing core.

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19. (new) The tyre of claim 18, wherein the at least one ply comprises two series of bands radially superimposed at least on the crown portion of the tyre.

20. (new) The tyre of claim 16, wherein the annular reinforcing cores, in a cross-sectional plane, are formed with an irregular trapezoidal shape comprising two bases, a radially internal base and a radially external base, and two inclined sides, an axially internal side and an axially external side.

21. (new) The tyre of claim 20, wherein a first angle of inclination, with respect to the axis of rotation of the tyre, of the axially internal side of the trapezoidal shape is smaller than a second angle of inclination of the neutral profile of the reinforcing structure in a region of the axially internal side, and wherein a third angle of inclination, with respect to the axis of rotation of the tyre, of the axially external side of the trapezoidal shape is greater than the second angle of inclination of the neutral profile of the reinforcing structure in the region of the axially external side.

22. (new) The tyre of claim 20, wherein a longitudinal dimension of the inclined sides of the annular reinforcing cores is between 10 mm and 25 mm, and a transverse dimension of the bases of the annular reinforcing cores is between 7 mm and 20 mm.

23. (new) The tyre of claim 16, wherein the spirals of metal wire comprise steel with a high carbon content.

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24. (new) The tyre of claim 16, wherein a cross section of the metal wire is hexagonal.

25. (new) The tyre of claim 16, wherein the annular reinforcing cores comprise a series of radially superimposed spirals of flat metal strip.

26. (new) The tyre of claim 16, wherein the annular reinforcing cores are not subject to a twisting torque due to an inflation pressure of the tyre.

27. (new) A method for increasing a load capacity of a tyre for vehicle wheels,

the tyre comprising a torus-shaped carcass having a central crown portion and two axially opposite sidewalls terminating in a pair of beads for fixing the tyre onto a corresponding mounting rim, each bead comprising at least one circumferentially unextendable annular reinforcing core comprising a series of spirals of metal wire radially superimposed and axially arranged alongside each other, the carcass having a reinforcing structure comprising at least one ply of rubberized fabric reinforced with metal cords lying in radial planes containing an axis of rotation of the tyre, the reinforcing structure having ends secured to the annular reinforcing cores and a neutral profile, lying in a radial cross-sectional plane, axially extending from bead to bead, the method comprising the steps of:

causing the neutral profile to intersect a cross section of a zone enclosing the annular reinforcing cores; and

causing the neutral profile to have a continuous curvature devoid of inflection points along an extension between the beads.

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